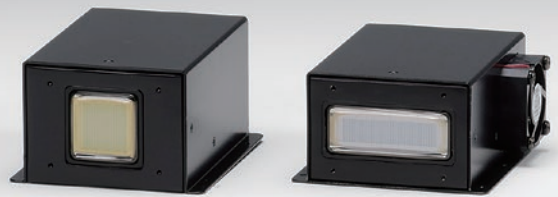
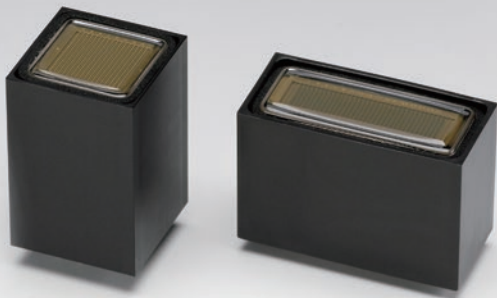


Linear multianode photomultiplier tube assemblies and photomultiplier tube modules





Applications

- Biomedical fluorescence detection
- Laser scanning detection
- Spectroscopy
- Environmental monitoring

Product lineup

Model name	H10515B	H11459	H7260	H11460
Appearance				
Number of channels ^①	16-channel		32-channel	
Effective area per channel ^①	0.8 mm × 16 mm		0.8 mm × 7 mm	
Channel pitch ^①	1 mm			
Output type	Current	Voltage	Current	Voltage

^①Described in the dimensional outline drawing

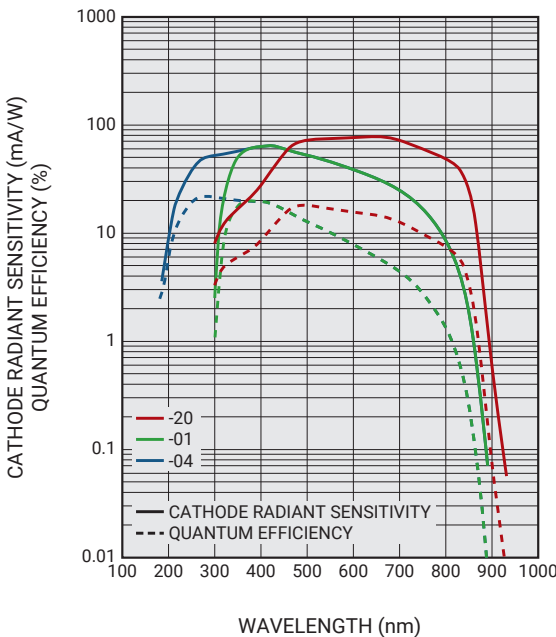
Photocathode lineup

Type No.	-01	-04	-20	-100	-103	-200	Unit
Photocathode material ^①	MA		ERMA	SBA		UBA	—
Spectral response range	300 to 880	185 to 880	300 to 920	300 to 650	185 to 650	300 to 650	nm
Peak wavelength	420		630	400		—	nm
Window material	Borosilicate glass	UV glass	Borosilicate glass		UV glass	Borosilicate glass	—
Gain (H10515B series and H11459 series)	Typ. 1 × 10 ⁶		—		3 × 10 ⁶	—	—
Gain (H7260 series and H11460 series)	Typ. 1 × 10 ⁶		—		2 × 10 ⁶	—	—
Uniformity between each anode	Typ. 1: 1.7		—		1: 1.5	—	—
	Max. 1: 2.5		—		1: 2	—	—

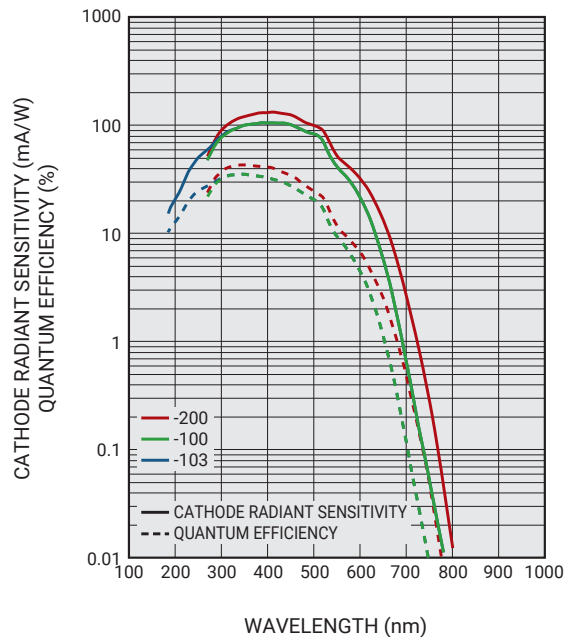
^①MA: Multialkali, SBA: Super bialkali, UBA: Ultra bialkali, ERMA: Extended red multialkali

Typical spectral response

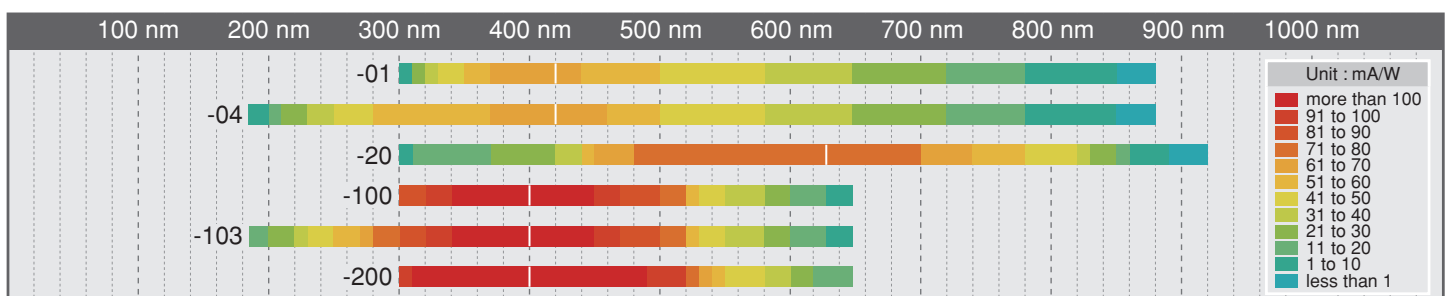
● -01, -04 and -20 types



● -100, -103 and -200 types



Cathode radiant sensitivity color chart



16 Channel model photomultiplier tube assembly

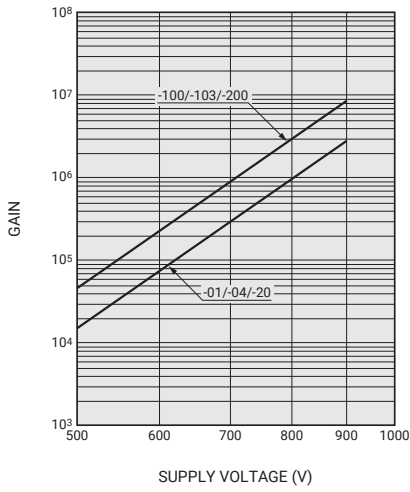
H10515B series

(at +25 °C)

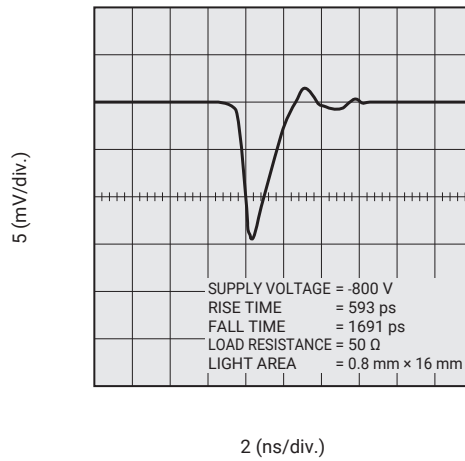
Parameter		H10515B-01	H10515B-04	H10515B-20	H10515B-100	H10515B-103	H10515B-200	Unit	
Supply voltage								-800	V dc
Max. supply voltage								-900	V dc
Max. total average anode current ^①								100	µA
Max. average anode current per channel ^①								10	µA
Max. voltage divider current ^②								0.37	mA
Dynode structure / Number of stages ^③		MC/10							—
Window material ^④		B	U	B	U	B	U	—	
Photocathode material ^⑤		MA		ERMA	SBA		UBA	—	
Spectral response range		300 to 880	185 to 880	300 to 920	300 to 650	185 to 650	300 to 650	nm	
Peak wavelength		420		630	400			nm	
Cathode characteristics	Luminous sensitivity	Min.	150	350	90		110	µA/lm	
		Typ.	250	500	105		135		
	Blue sensitivity index	Typ.	—			13.5	15.5	—	
	Red/White ratio	Typ.	0.3	0.45	—			—	
Radiant sensitivity ^⑥		Typ.	65	78	110		130	mA/W	
Anode characteristics ^⑦	Luminous sensitivity	Min.	75	175	90		110	A/lm	
		Typ.	250	500	315		405		
	Gain	Typ.	1 × 10 ⁶		3 × 10 ⁶			—	
	Dark current per channel ^⑧	Typ.	0.5	1	0.2			nA	
		Max.	5	10	2				
	Time response	Rise time	Typ.	0.6				ns	
		T.T.S.	Typ.	0.18					
	Pulse linearity per channel ^{⑨⑩}		Typ.	0.8				mA	
Cross-talk		Typ.	3				%		
Uniformity between each anode	Typ.	1: 1.7		1: 1.5			—		
	Max.	1: 2.5		1: 2					
Insulation cover material		P.O.M. (Polyoxymethylene)						—	
Socket ^⑪		SD-108-T-22, ASP24307-02						—	
Operating ambient temperature ^⑫		0 to +50						°C	
Storage temperature ^⑫		-15 to +50						°C	
Weight		51.5						g	

- NOTE:** ① Averaged over any interval of 30 s maximum.
 ② Measured with the maximum supply voltage.
 ③ MC: Metal channel
 ④ B: Borosilicate glass, U: UV glass
 ⑤ MA: Multialkali, SBA: Super bialkali, UBA: Ultra bialkali, ERMA: Extended red multialkali
 ⑥ Measured at the peak sensitivity wavelength
 ⑦ Anode characteristics are measured with the supply voltage.
 ⑧ After 30 min storage in darkness.
 ⑨ The pulse width is 50 ns and the repetition rate is 1 kHz.
 ⑩ ±2 % deviation
 ⑪ Supplied
 ⑫ No condensation

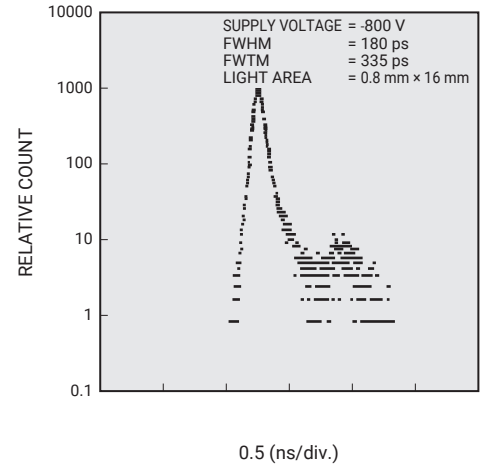
Typical gain



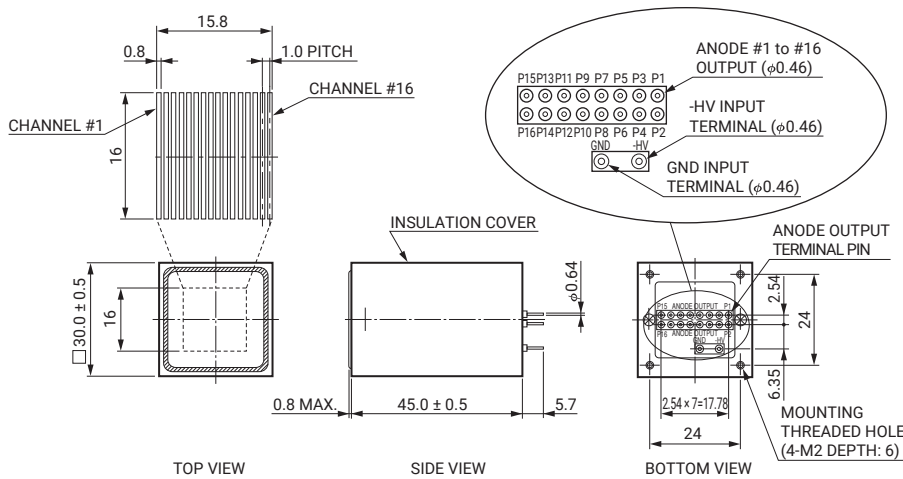
Typical time response



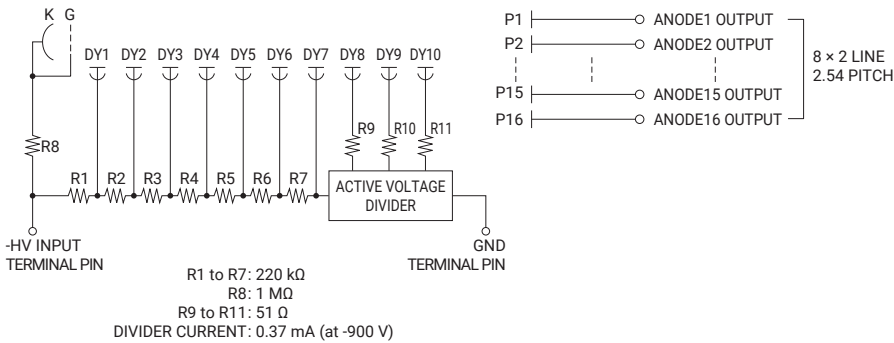
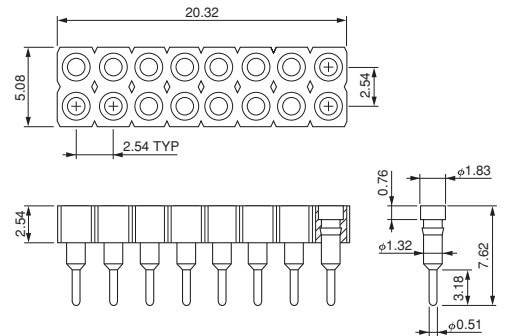
Typical transit time spread characteristics



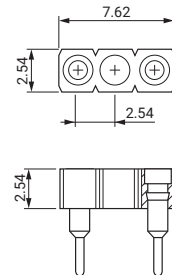
Dimensional outline and circuit diagram (Unit: mm)



● Socket: SD-108-T-22 (supplied)



● Socket: ASP24307-02 (supplied)



16 Channel model photomultiplier tube module

H11459 series

(at +25 °C)

Parameter		H11459-01	H11459-04	H11459-20	H11459-100	H11459-103	H11459-200	Unit	
Input voltage		±11.5 to ±15.5						V	
Input current ^①		+46 / -42						mA	
Max. input voltage		±16						V	
Max. control voltage ^②		3.6						V	
Max. output signal voltage /ch ^{③④}		1						V	
Recommended control voltage adjustment range ^②		+2.0 to +3.2						V	
Window material ^⑤		B	U	B	U	B		—	
Photocathode material ^⑥		MA		ERMA	SBA		UBA	—	
Spectral response range		300 to 880	185 to 880	300 to 920	300 to 650	185 to 650	300 to 650	nm	
Peak wavelength		420		630	400			nm	
Cathode characteristics	Luminous sensitivity	Min.	150	350	90		110	μA/lm	
		Typ.	250	500	105		135		
	Blue sensitivity index	Typ.	—			13.5		15.5	—
	Red/White ratio	Typ.	0.3	0.45	—			—	
Radiant sensitivity ^⑦		Typ.	65	78	110		130	mA/W	
Anode characteristics ^⑧	Luminous sensitivity	Min.	7.5×10^6	1.75×10^7	9.0×10^6		1.1×10^7	V/lm	
		Typ.	2.5×10^7	5.0×10^7	3.15×10^7		4.05×10^7		
	Gain	Typ.	1×10^6		3×10^6			—	
	Voltage output depending on PMT dark current per channel ^⑨	Typ.	0.05	0.1	0.02			mV	
	Cross-talk	Typ.	3					%	
	Uniformity between each anode	Typ.	1: 1.7			1: 1.5			—
Max.		1: 2.5			1: 2			—	
Offset voltage		Max.	2					mV	
Ripple noise (peak to peak)		Typ.	1					mV	
Frequency bandwidth		DC to 1 MHz						—	
Current-to-voltage conversion factor		0.1						V/μA	
Operating ambient temperature		+5 to +45						°C	
Storage temperature		-20 to +50						°C	
Weight		185						g	

NOTE: ① At 15 V input voltage in darkness

② Input impedance = 400 kΩ

③ Load resistance = 10 kΩ, Average over any interval of 30 s maximum.

④ Maximum pulse output signal voltage = +10 V, The pulse width is 10 μs and the repetition rate is 1 kHz.

⑤ B: Borosilicate glass, U: UV glass

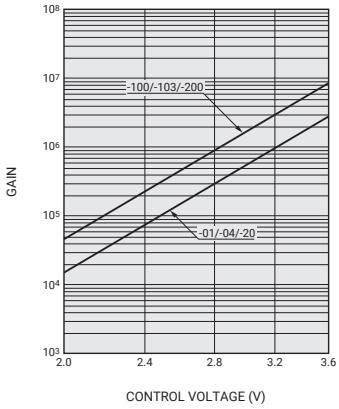
⑥ MA: Multialkali, SBA: Super bialkali, UBA: Ultra bialkali, ERMA: Extended red multialkali

⑦ Measured at the peak sensitivity wavelength

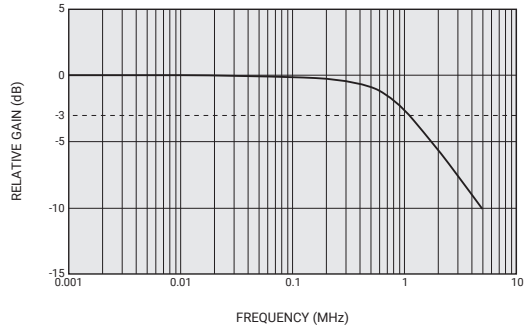
⑧ Control voltage = +3.2 V

⑨ After 30 min storage in darkness. The actual output value in darkness is the sum of dark current and offset voltage.

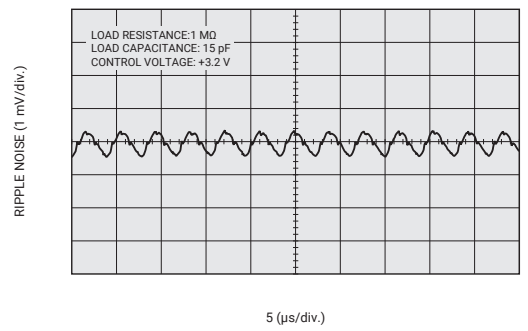
Typical gain



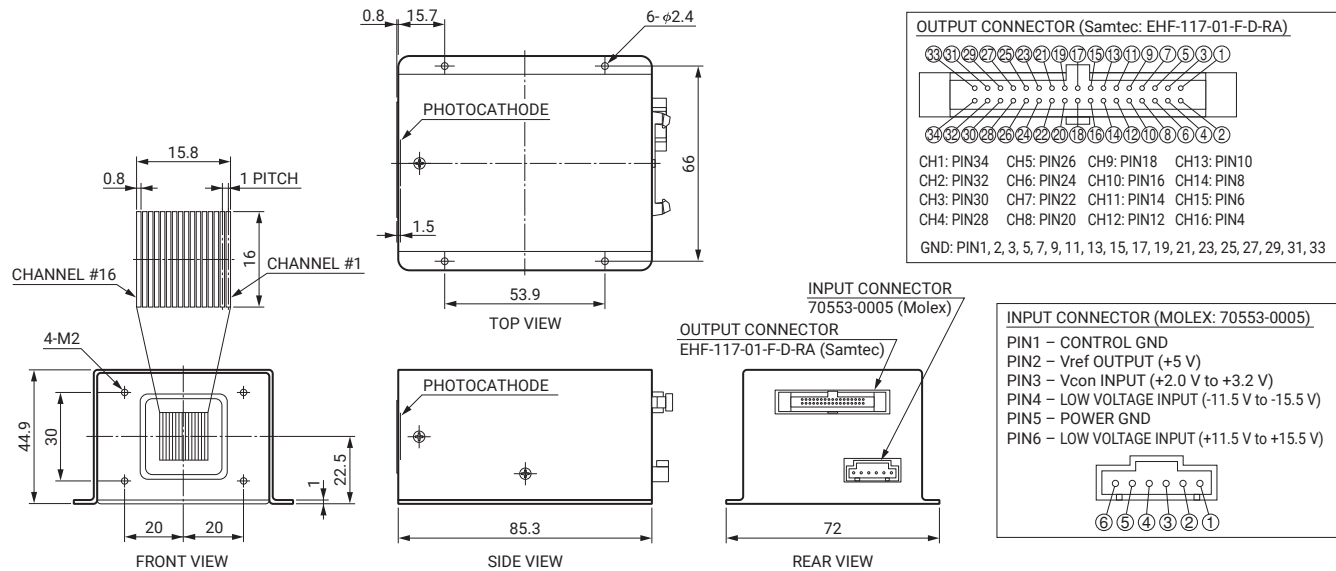
Typical frequency response



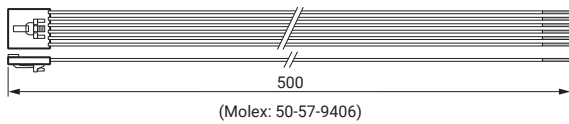
Typical ripple noise



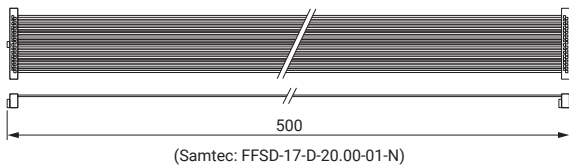
Dimensional outline (Unit: mm)



● Power cable (supplied)



● Ribbon cable (supplied)



32 Channel model photomultiplier tube assembly

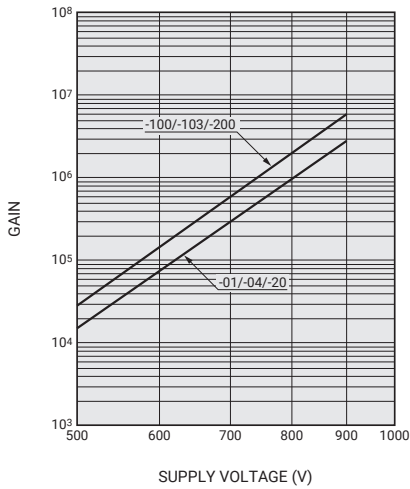
H7260 series

(at +25 °C)

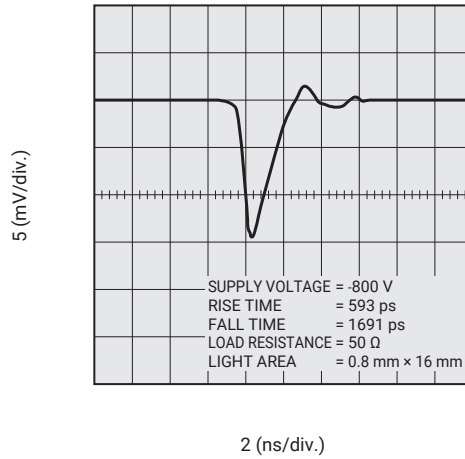
Parameter		H7260-01	H7260-04	H7260-20	H7260-100	H7260-103	H7260-200	Unit	
Supply voltage					-800			V dc	
Max. supply voltage					-900			V dc	
Max. total average anode current ^①					100			μA	
Max. average anode current per channel ^①					6			μA	
Max. voltage divider current ^②					0.37			mA	
Dynode structure / Number of stages ^③		MC/10						—	
Window material ^④		B	U	B	U	B		—	
Photocathode material ^⑤		MA		ERMA	SBA		UBA	—	
Spectral response range		300 to 880	185 to 880	300 to 920	300 to 650	185 to 650	300 to 650	nm	
Peak wavelength		420		630	400			nm	
Cathode characteristics	Luminous sensitivity	Min.	150	350	90		110	μA/lm	
		Typ.	250	500	105		135		
	Blue sensitivity index	Typ.	—			13.5	15.5	—	
	Red/White ratio	Typ.	0.3	0.45	—			—	
Radiant sensitivity ^⑥		Typ.	65	78	110		130	mA/W	
Anode characteristics ^⑦	Luminous sensitivity	Min.	75	175	90		110	A/lm	
		Typ.	250	500	210		270		
	Gain	Typ.	1 × 10 ⁶		2 × 10 ⁶			—	
	Dark current per channel ^⑧	Typ.	0.5	1	0.2			nA	
		Max.	5	10	2				
	Time response	Rise time	Typ.	0.6					ns
		T.T.S.	Typ.	0.18					
	Pulse linearity per channel ^{⑨⑩}		Typ.	0.6					mA
Cross-talk		Typ.	3					%	
Uniformity between each anode	Typ.	1: 1.7			1: 1.5			—	
	Max.	1: 2.5			1: 2				
Insulation cover material		P.O.M. (Polyoxymethylene)						—	
Socket ^⑪		SD-108-T-22 × 2 pcs						—	
Operating ambient temperature ^⑫		0 to +50						°C	
Storage temperature ^⑫		-15 to +50						°C	
Weight		62						g	

- NOTE:** ① Averaged over any interval of 30 s maximum.
 ② Measured with the maximum supply voltage.
 ③ MC: Metal channel
 ④ B: Borosilicate glass, U: UV glass
 ⑤ MA: Multialkali, SBA: Super bialkali, UBA: Ultra bialkali, ERMA: Extended red multialkali
 ⑥ Measured at the peak sensitivity wavelength
 ⑦ Anode characteristics are measured with the supply voltage.
 ⑧ After 30 min storage in darkness.
 ⑨ The pulse width is 50 ns and the repetition rate is 1 kHz.
 ⑩ ±2 % deviation
 ⑪ Supplied
 ⑫ No condensation

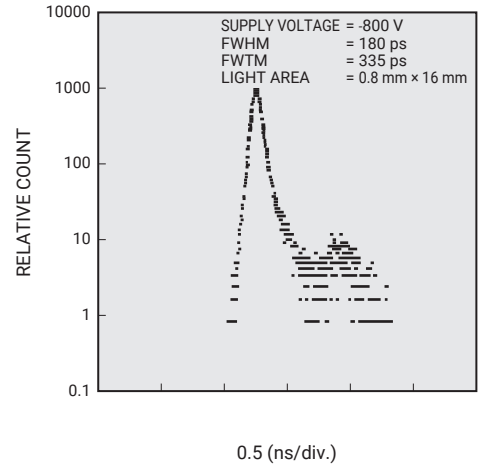
Typical gain



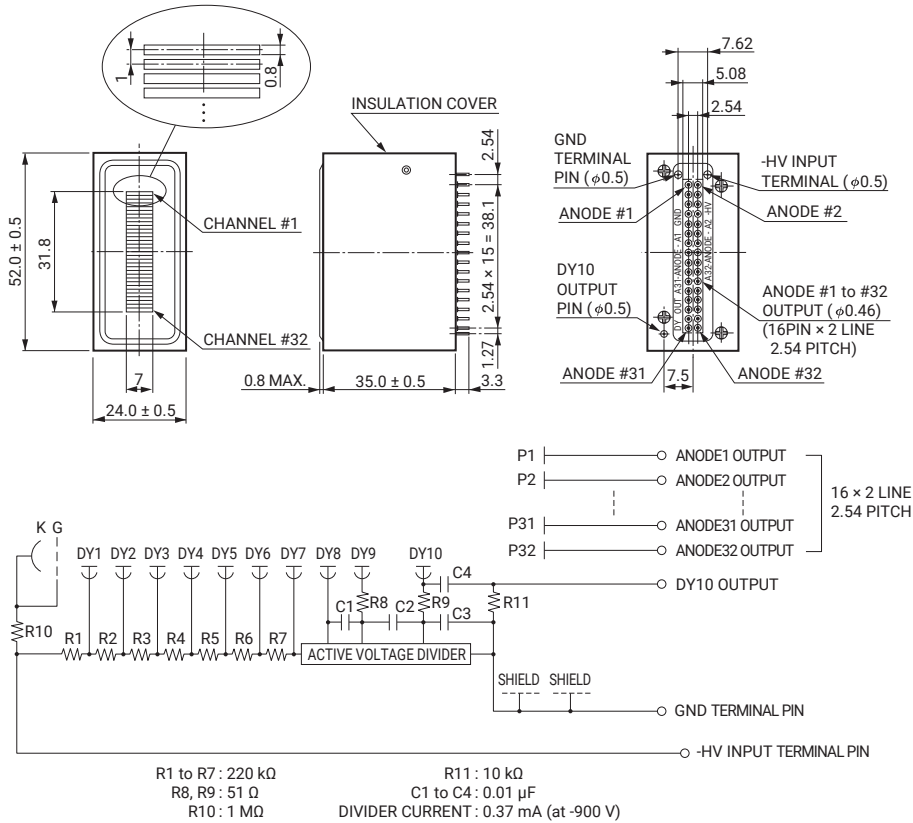
Typical time response



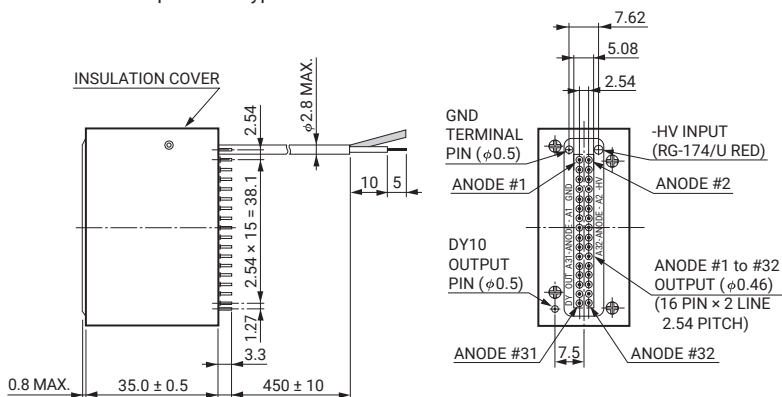
Typical transit time spread characteristics



Dimensional outline and circuit diagram (Unit: mm)



● H7260A: -HV input cable type is available



32 Channel model photomultiplier tube module

H11460 series

(at +25 °C)

Parameter		H11460-01	H11460-04	H11460-20	H11460-100	H11460-103	H11460-200	Unit
Input voltage		±11.5 to ±15.5						V
Input current ^①		+127 / -83						mA
Max. input voltage		±16						V
Max. control voltage ^②		3.6						V
Max. output signal voltage /ch ^{③④}		1						V
Recommended control voltage adjustment range ^②		+2.0 to +3.2						V
Window material ^⑤		B	U	B	U	B		—
Photocathode material ^⑥		MA		ERMA	SBA		UBA	—
Spectral response range		300 to 880	185 to 880	300 to 920	300 to 650	185 to 650	300 to 650	nm
Peak wavelength		420		630	400			nm
Cathode characteristics	Luminous sensitivity	Min.	150	350	90		110	μA/lm
		Typ.	250	500	105		135	
	Blue sensitivity index	Typ.	—			13.5	15.5	—
	Red/White ratio	Typ.	0.3	0.45	—			—
Radiant sensitivity ^⑦		Typ.	65	78	110		130	mA/W
Anode characteristics ^⑧	Luminous sensitivity	Min.	7.5×10^6	1.75×10^7	9.0×10^6		1.1×10^7	V/lm
		Typ.	2.5×10^7	5.0×10^7	2.1×10^7		2.7×10^7	
	Gain	Typ.	1×10^6		2×10^6			—
	Voltage output depending on PMT dark current per channel ^⑨	Typ.	0.05	0.1	0.02			mV
	Cross-talk	Typ.	3					%
	Uniformity between each anode	Typ.	1: 1.7			1: 1.5		
Max.		1: 2.5			1: 2			—
Offset voltage		Max.	2					mV
Ripple noise (peak to peak)		Typ.	1					mV
Frequency bandwidth		DC to 1 MHz						—
Current-to-voltage conversion factor		0.1						V/μA
Operating ambient temperature		+5 to +45						°C
Storage temperature		-20 to +50						°C
Weight		246						g

NOTE: ① At 15 V input voltage in darkness

② Input impedance = 400 kΩ

③ Load resistance = 10 kΩ, Average over any interval of 30 s maximum.

④ Maximum pulse output signal voltage = +10 V, The pulse width is 10 μs and the repetition rate is 1 kHz.

⑤ B: Borosilicate glass, U: UV glass

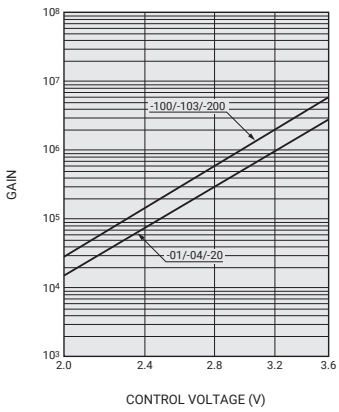
⑥ MA: Multialkali, SBA: Super bialkali, UBA: Ultra bialkali, ERMA: Extended red multialkali

⑦ Measured at the peak sensitivity wavelength

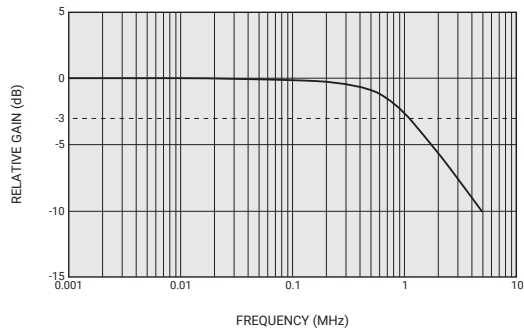
⑧ Control voltage = +3.2 V

⑨ After 30 min storage in darkness. The actual output value in darkness is the sum of dark current and offset voltage.

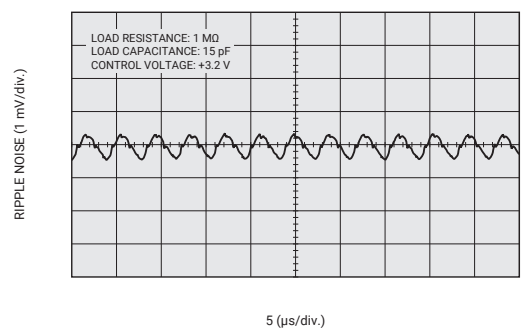
Typical gain



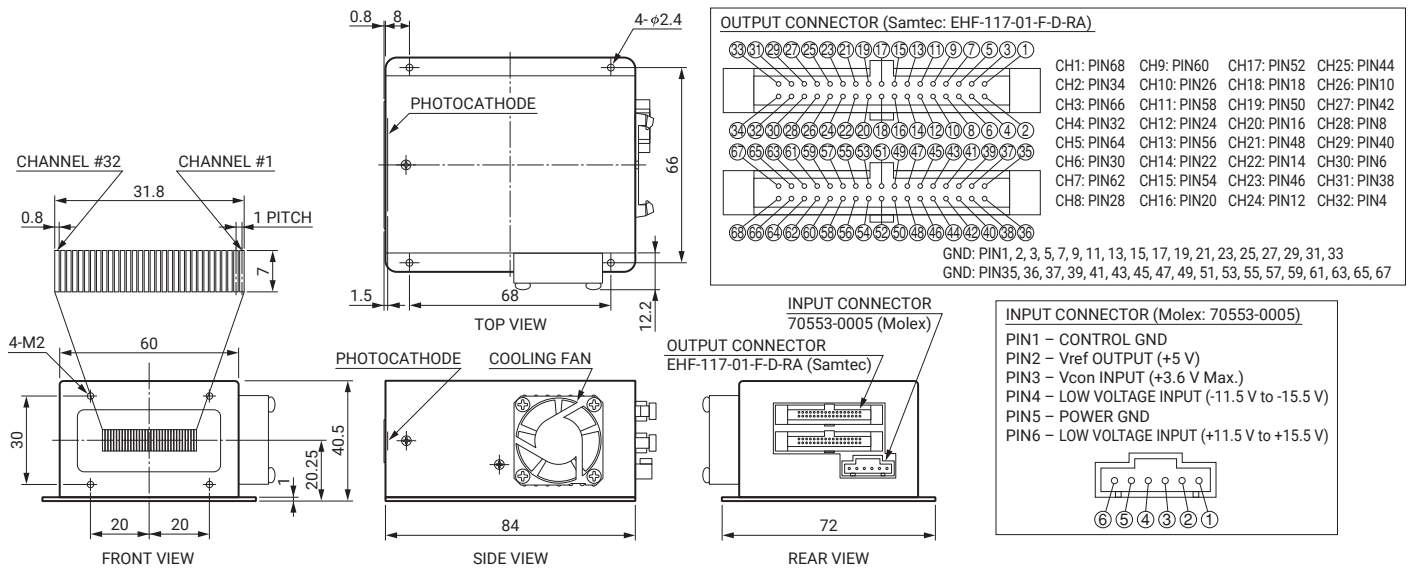
Typical frequency response



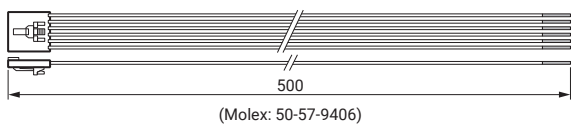
Typical ripple noise



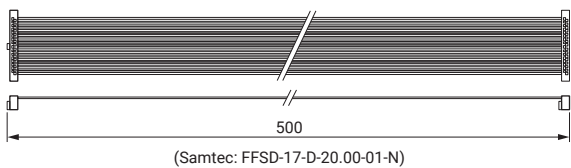
Dimensional outline (Unit: mm)



Power cable (supplied)

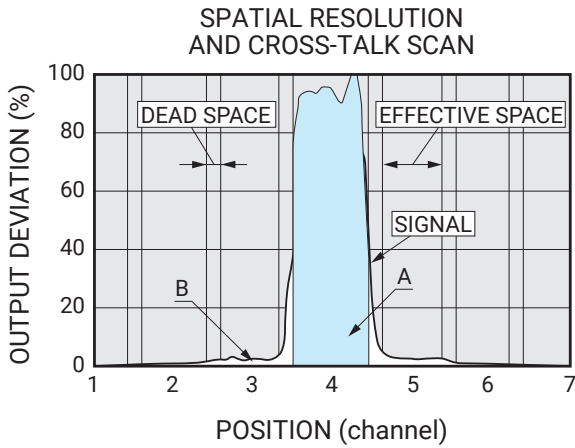


Ribbon cable (supplied)

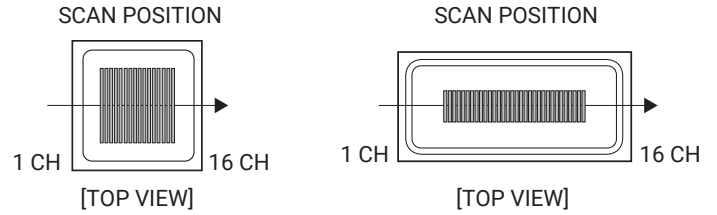


Cross-talk

Example



* LIGHT SOURCE : TUNGSTEN LAMP
 SPOT DIAMETER : 100 μm
 SCAN PITCH : 50 μm

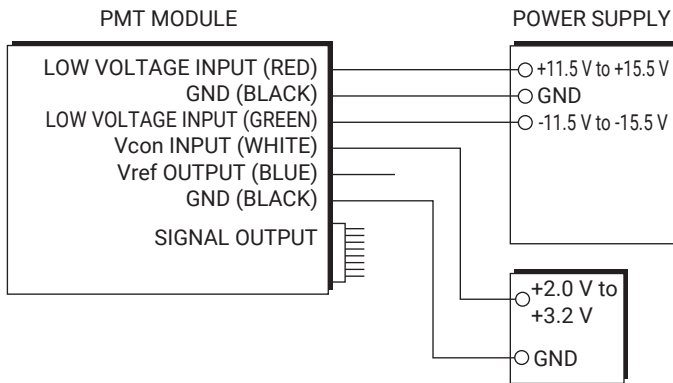


CROSS-TALK RATIO (%)				
100	3.0	0.6	0.2	0.1
2.7	100	3.0	0.6	0.2
0.8	2.9	100	2.9	0.6
0.3	0.8	2.9	100	2.9
0.1	0.3	0.8	3.1	100

* Supply voltage -800 V
 Cross-talk
 $\text{Area B} / \text{Area A} \times 100$
 H7260 series is equivalent to H10515B series.

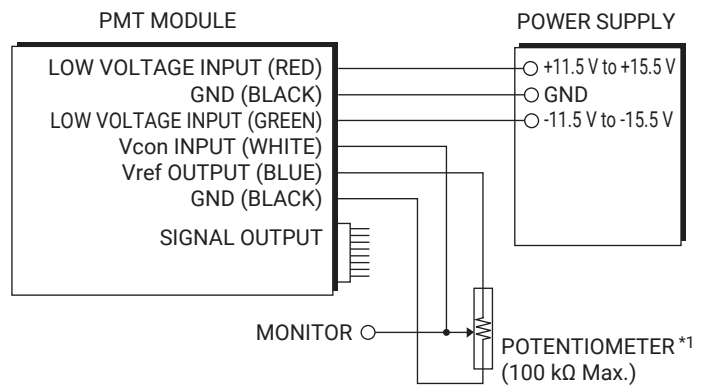
Sensitivity adjustment method

Voltage programming



- Adjust the control voltage to adjust the sensitivity.
- Electrically insulate the reference voltage output.

Resistance programming



- *1: When using a potentiometer to adjust sensitivity, monitor the control voltage so that it does not exceed +3.6 V (H11459 / H11460).

Related products for PMT assembly



High voltage power supply module
C10940-03

- Max. output voltage : -1200 V
- Output current : 0.6 mA
- Input voltage : +5 V \pm 0.5 V
- Dimensions (W \times H \times D) : 15 \times 18 \times 15 mm
- Ripple noise (peak to peak): 50 mV
- Weight : 7.7 g



High voltage power supply module
C13890-15

- Max. output voltage : -1250 V
- Output current : 0.6 mA
- Input voltage : +11 V to +16 V
- Dimensions (W \times H \times D) : 46 \times 24 \times 12 mm
- Ripple noise (peak to peak): 38 mV
- Weight : 28.3 g

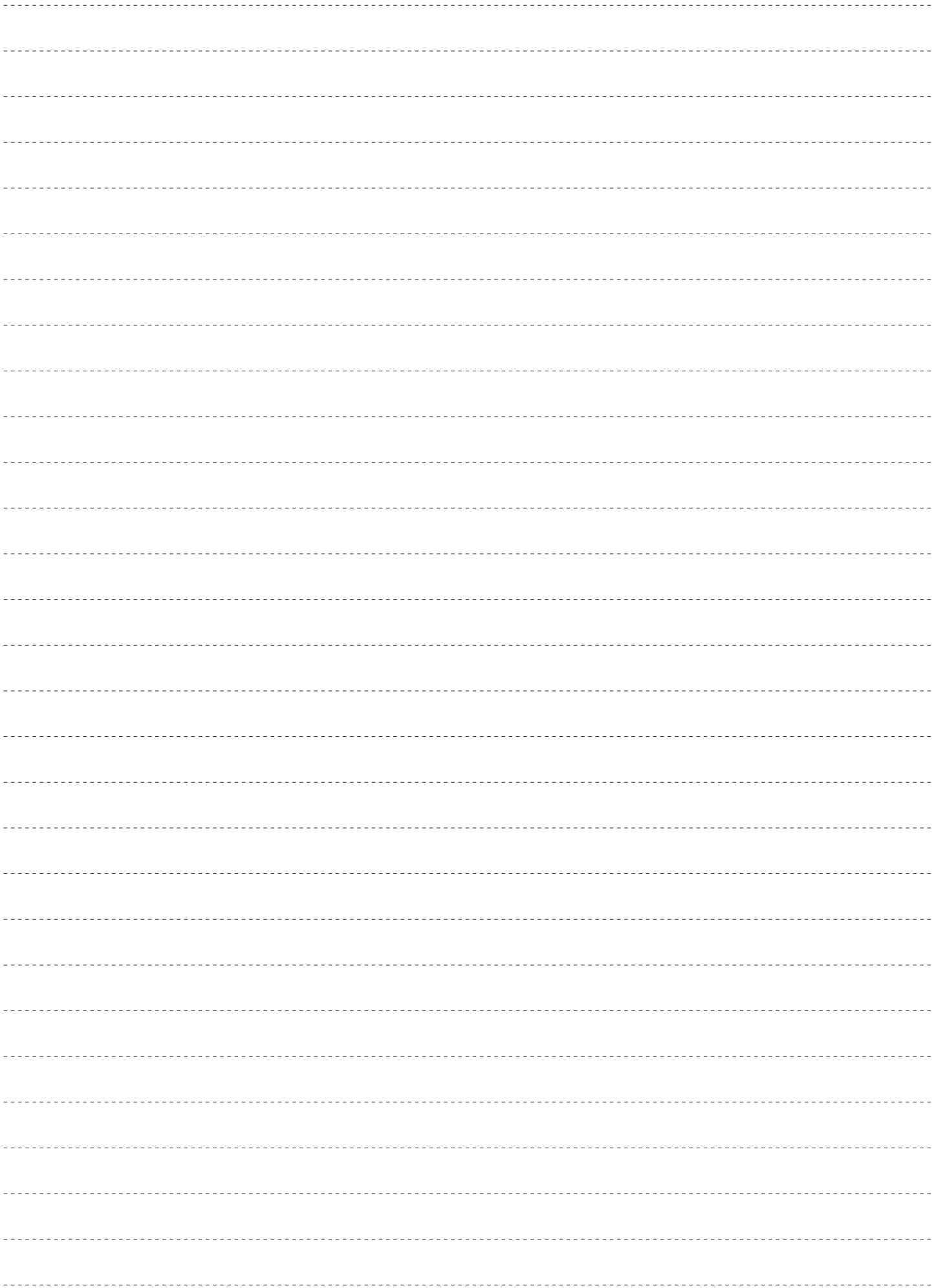


High voltage power supply module
C11152, C11152-01

- Max. output voltage : -1500 V
- Output current : 1 mA
- Input voltage : +15 \pm 1 V (C11152), +12 \pm 0.5 V (C11152-01)
- Dimensions (W \times H \times D) : 41 \times 10 \times 41 mm
- Ripple noise (peak to peak): 5 mV (> 5 kHz), 8 mV (\leq 5 kHz)
- Weight : 38 g

MEMO

A series of horizontal dashed lines for writing a memo.



 **WARNING ~ High Voltage ~**

The product is operated at high voltage potential. Further, the metal housing of the product is connected to the photocathode (potential) so that it becomes a high voltage potential when the product is operated at a negative high voltage (anode grounded). Accordingly, extreme safety care must be taken for the electrical shock hazard to the operator or the damage to the other instruments.

* PATENT: USA Pat. No. 5410211 PATENT PENDING: JAPAN 12, USA 8, EUROPE 9

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Electron Tube Division

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